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ABSTRACT

This report contains an annotated list of selected publications readily available to the public on how to conserve energy in the food system. It is divided into eight sections, six representing sectors of the food system, one for "transportation," and a section entitled "multiple sector application." There are citations in each section, however, that apply to more than one food system sector. Each publication reference (except those for magazines) includes the price and name and address of the organization that distributes it. Many of the documents are available from government agencies. (Author/MLF)

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energy conservation

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Energy Conservation in the Food System

A Publications List

May 1976

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NATIONAL INSTITUTE OF EDUCATION

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Energy Conservation in the Food System

A Publications List

May 1976

Office of
Industrial Programs

Energy
Conservation
Now

Federal Energy
Administration

Washington
D.C. 20461

Energy Conservation and
Environment

in cooperation with
FEA Food Industry Advisory Committee

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INTRODUCTION

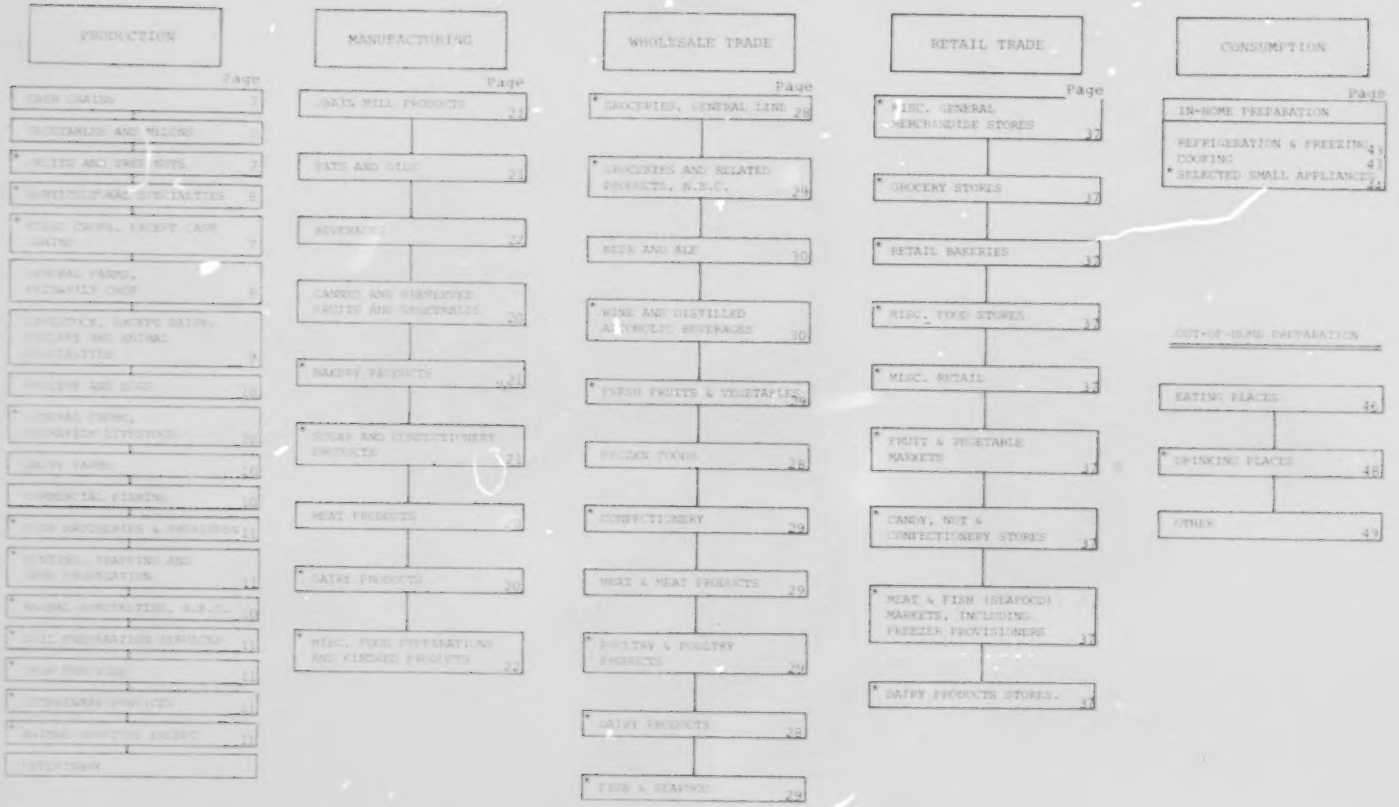
This report contains an annotated list of selected publications readily available to the public on how to conserve energy in the food system. It is divided into eight sections, six representing sectors of the food system, one for "Transportation," and a section entitled "Multiple Sector Applications." There are citations in each section, however, which apply to more than one food system sector.

Each publication reference (except those for magazines, which can be located at public or university libraries or through the organizations that publish them) includes the price and name and address of the organization that distributes it. Many of the documents are available from government agencies. Rather than repeat their addresses in each entry, they are marked with an asterisk (*) and listed at the end of the report.

The chart on the following page was summarized from the comprehensive diagram of direct producing and consuming sectors outlined in the FEA report "Energy Use in the Food System." Each major subsector is represented. An asterisk (*) designates categories where no specific energy conservation publications could be located.

Both "Energy Use in the Food System" and this companion publication, "Energy Conservation in the Food System — Publications List," were initiated by and developed with the cooperation of the FEA Food Industry Advisory Committee. The Federal Energy Administration gratefully acknowledges the assistance from the Advisory Committee and from other government agencies and organizations that responded to requests for published information.

DIRECT PRODUCING AND CONSUMING SECTORS OF THE FOOD SYSTEM



Note: Transportation and multiple sector applications referenced begin on pages 52 and 57 respectively.

I. PRODUCTION

This food system sector includes establishments primarily engaged in agricultural production, commercial fishing, hunting and trapping, and related services. The classification of agricultural production covers establishments engaged in the production of crops, plants, vines, or trees (excluding forestry operations); and the keeping, grazing, or feeding of livestock. Livestock as used here includes cattle, sheep, goats, hogs, and poultry. Also included are animal specialties such as horses, rabbits, bees, pets, fur-bearing animals in captivity, and fish in captivity. The classification of agricultural services includes establishments primarily engaged in supplying soil preparation services, crop services, landscape and horticultural services, veterinary and other animal services, and farm labor and management services. The classification of fishing, hunting, and trapping covers establishments primarily engaged in commercial fishing (including shell fish and marine products); operating fish hatcheries, and fish and game preserves; and commercial hunting and trapping.

I. PRODUCTION

1. GENERAL

Amarillo College and West Texas State University.
"Potential for Wind Generated Power in Texas." Prepared by V. Nelson and E. Gilmore for the State of Texas Governor's Energy and Advisory Council. Project Number N/T-8, November 1974.

General information on wind energy and a summary of current information on wind energy conservation systems are included. Estimations of power, possible uses, costs, and storage are discussed for wind energy conversion systems in Texas.

Clemson University, College of Agriculture Science.
"Energy Conservation in Agricultural Production." 1974.

General conservation practices for agriculture including farm buildings, machinery use, plant disease control, horticultural crops, livestock, and poultry and forest products.

Frederick, W.
"Energy," Texas Agricultural Progress, vol. 20, no. 3, Summer 1974.

An overview of current energy issues including a long-run energy strategy for agriculture, wood, the energy crisis and energy conservation and management.

Iowa State University.
"Electric Demand Characteristics of Farms and Farm Equipment." Prepared by L. Soderholm. March 1975.

Ascertains the electric demand characteristics of farms and farm equipment. Applies the data acquired to solving problems concerned with the sizing and the performance of transformers, service entrances, farmstead electric distribution systems and electrically operated farm equipment.

Kansas Department of Economic Development.
"Energy Conservation: Opportunities for State Action." Prepared by J. Johnson. September 1974.

Survey of potential energy saving techniques and methods in agriculture in the State of Kansas.

Kucera, H.; Schuler, R.; and Vogel, B.
"Testing Radial Ply Tractor Tires," Farm Research, vol. 32, no. 2, November/December 1974.

Compares radial ply tractor tires to first-line conventional tires. The results show radial ply tires reduced fuel consumption and slippage and increased field capacity.

Texas A&M University, Agriculture Engineering Department.
"Energy Utilization and Efficiency in Agriculture." Prepared by C.G. Coble. October 1974.

Includes methods to conserve the use of energy in present agricultural production practices, new production and processing practices for energy consuming operations which will decrease the energy input, and alternatives sources of energy for agriculture.

U.S. Department of Agriculture, Economic Research Service.
"Agriculture: Energy Use and Conservation." Prepared by Earl Gavett. Presented at the seminar series on "Energy and Agriculture," Texas A&M University, College Station, Texas, July 1974.

Presents data on the use of energy in agriculture, indicates areas where additional statistical evidence is needed, and examines a number of conservation measures designed to reduce the demand for petroleum energy in agriculture.

U.S. Federal Energy Administration.
Agriculture — Handling Fuel Problems. 8 pages. Washington: Government Printing Office. (GPO Stock Number 5800-00003) $0.25. Available from GPO.*

Includes advice for farmers on their fuel problems, a conservation checklist, and a listing of FEA regional offices.

University of Arizona, Task Force of the Council for Agriculture Science and Technology.
"Energy in Agriculture." Prepared by K. Barnes. November 1973.

Examines agriculture's energy use in the areas of field operations, fertilizer, irrigation, drying and processing, animal production, transportation and farm families and workers. Reveals short- and long-term opportunities for reduced energy use and the risks and consequences of reduction of energy to agriculture.

University of California, Davis Campus, Agriculture Engineering Department.
"Energy Research at the University of California." Prepared by W. Chancellor. November 1974.

Agricultural energy resources, use and conservation in California. Discusses methods of energy conservation for irrigation, fertilizer production, crop and livestock production, and transportation and processing of farm products.

University of Montana, Agriculture Engineering Department.
"Energy Utilization as Related to Farmstead Mechanization, Materials Handling and Rural Living." Prepared by K.L. McFate. June 1974.

Focuses primarily upon the optimization of energy utilization in handling farm materials, in drying farm crops, in hog production techniques, and in maintaining economical heat balances in both human and livestock housing units.

U.S. Department of Agriculture, Agriculture Research Service.
"Relative Energy Requirements for Minimum Tillage Systems — Southern High Plains." Prepared by R.A. Ronald, Southwestern Great Plains Research Center. March 1975.

Energy requirement study of reduced tillage systems for surface irrigated cropping. The study involves different tillage systems for grain sorghum and winter wheat. Some reduced tillage systems have shown the potential for fuel savings of 25-50 percent over so-called conventional tillage systems.

2. CASH GRAINS

Purdue University, Agriculture Engineering Department. "Operating Dryers to Conserve Fuel." Prepared by R.M. Peart. Presented at the Grain Conditioning Conference, University of Illinois, January 1975.

Conserve fuel in operating modern grain dryers by not overdrying, by using dryeration, by reducing temperatures on high-speed dryers, and by using low-temperature drying as a supplement system.

University of Wisconsin, Agriculture Engineering Department. "Low Temperature Drying of Grain Treated With Chemical Preservatives." Prepared by M.F. Finner, G.C. Shove, G.P. Barrington, and M.F. Walter. Presented at the winter meeting of the ASAE, Chicago, Illinois, December 1974.

Discusses the use of chemical preservatives that allow corn to dry longer in a storage bin without spoiling, thus saving fuel previously used for drying.

3. FIELD CROPS, EXCEPT CASH GRAINS

No publications could be located specifically for this sector.

4. VEGETABLES AND MELONS

University of Arizona, Environmental Research Laboratory. "Development and Application of Controlled-Environmental Systems for Food Production." Prepared by C.N. Hodges. June 1974.

Discusses a method devised for culturing vegetables and shrimp in controlled-environmental structures that utilize desalted seawater and a total-energy concept; i.e., the harnessing of waste heat from generators.

5. FRUITS AND TREE NUTS

No publications could be located specifically for this sector.

6. HORTICULTURAL SPECIALTIES

No publications could be located specifically for this sector.

7. GENERAL FARMS, PRIMARILY CROPS

Connecticut, Agriculture Experiment Station.
"Energy Use and Crop Production." Prepared by G. Heichel January 1975.

Reviews the energy requirements of major crop production systems. Compares for several crops the yield of food energy and protein with the energy requirements of production. Examines technological alternatives for lessening the use of expensive fossil fuels in crop production, and for increasing the usefulness of plants as food and fuel sources.

Council for Agricultural Science and Technology.
"Potential for Energy Conservation in Agricultural Production." Prepared by the Task Force on Potential for Energy Conservation in Agricultural Production. Report Number 40, February 1975.

Considers energy use in nearly all areas of farm production. Alternative technologies are described, and estimates of potential energy savings are made for situations in which available information seems to justify them.

Heichel, G.
"Energy Needs and Food Yields," Technological Review, vol. 76, no. 8, July/August 1974.

Determines the energy consumption of U.S. agriculture in the production of raw agriculture products. Determines how the food energy yields of cropping systems respond to the investment of energy in crop production. Compares the efficiency of energy use in different systems of raising crops and explores possibilities for increasing the energy efficiency of agriculture.

Kansas State University, Agriculture Engineering Department.
"Energy-Cost Budgets for Grain Sorghum Tillage Systems."

Prepared by S. Clark and W. Johnson. Presented at the 1974 Annual Meeting of ASAE. June 1974.

Evaluates tillage systems in terms of costs and energy inputs. Results show that tillage costs are slightly higher for reduced tillage systems but energy costs are considerably lower.

Pimentel, D.; Hurd, L.E.; Bellatti; Forster, M.J.; Oka, I.N.; and Whitman, R.J.
"Food Production and the Energy Crisis," Science, vol. 182, November 1973.

Selects a single crop (maize) which typifies the energy inputs for crops in general, and makes a detailed analysis of its production energy inputs. Examines energy needs for a world food supply which depends on modern energy intensive agriculture. Considers alternatives in crop production technology which might reduce energy inputs in food production.

Schneider, A.
"Energy Requirements Low for Tailwater and Lake Pumps," The Cross Section, vol. 21, no. 2, February 1975.

A short article to show irrigators the advantage of using irrigation water supplies with low energy requirements.

8. LIVESTOCK, EXCEPT DAIRY, POULTRY AND ANIMAL SPECIALTIES

Converse, J.C., and Graves, R.E.
"Energy Facts — Facts on Methane Production From Animal Manure," Cooperative Extension Programs Fact Sheet. University of Wisconsin. July 1974.

This report deals with obtaining methane gas and other related products from cattle manure.

Lindsley, E.F.
"Cowpower Helps Run His Farm," Popular Science, vol. 206, May 1975, pp. 106-107.

In an experimental operation, a Vermont engineer-farmer is converting waste manure to bio-gas (methane), which in turn is burned as gasoline or natural gas to power an electric generator.

9. DAIRY FARMS

Lundstrom, D., and Karsky, T.
"Livestock Building Insulation," Electric Farm Power, no. 59, spring 1974.

Discusses livestock building insulation, insulation values and requirements, vapor barriers, and insulation installment for various buildings.

10. POULTRY AND EGGS

University of Maryland, Poultry Science and Agriculture Engineering Department.
"Physiological Response of Chickens to Dairying Environments." Prepared by L. Carr, K. Felton and T.A. Carter. 1975.

Discusses the minimum ventilation rates that may be used to conserve energy and still provide a healthy environment for chicks.

11. ANIMAL SPECIALTIES, NOT ELSEWHERE CLASSIFIED

No publications could be located specifically for this sector.

12. GENERAL FARMS, PRIMARILY LIVESTOCK

No publications could be located specifically for this sector.

13. COMMERCIAL FISHING

Farmer, Weston.
"Old Fuel System May be Answer to Costly Oil," National Fisherman, June 1975, pp. 22A+ and July 1975, p. 22A.

Examines the economics of burning anthracite pea coal in a gas produced aboard ship. Early vessels, prior to WWI, using this type of fuel are described. Types of boats suitable for conversion to this type of fuel are specified.

Gardner, John.
"Traditional Small Boat Sail Rigs Would Make Much Sense Today," National Fisherman, October 1974, pp. 8A+.

Discussion of the advantages and limitations of traditional sail rigs for small work boats. Focus is upon sailing and handling characteristics, rather than upon applicability to modern fishing fleets.

Pileggi, Joseph, and Guinan, John A.
"Energy and the U.S. Fisherman," Energy 74, National Marine Fisheries Service, Department of Commerce, 1974, 4 pages.

Includes some common practices that have been used by commercial fishermen to conserve energy.

14. FISH HATCHERIES AND PRESERVES

No publications could be located specifically for this sector.

15. HUNTING, TRAPPING AND GAME PROPAGATION

No publications could be located specifically for this sector.

16. SOIL PREPARATION SERVICES

No publications could be located specifically for this sector.

17. CROP SERVICES

No publications could be located specifically for this sector.

18. VETERINARY SERVICES

No publications could be located specifically for this sector.

19. ANIMAL SERVICES, EXCEPT VETERINARY

No publications could be located specifically for this sector.

II. MANUFACTURING

The manufacturing sector of the food system includes establishments engaged in the mechanical or chemical transformation of materials or substances into new products. These establishments are usually described as plants, factories, or mills and characteristically use power driven machines and materials handling equipment. The materials processed by manufacturing establishments include products of agriculture and fishing, as well as products of other manufacturing establishments. The major group includes establishments manufacturing or processing foods and beverages for human consumption, and certain related products, such as manufactured ice, chewing gum, vegetable and animal fats and oils, and prepared feeds for animals and fowl.

II. MANUFACTURING

1. GENERAL

Anderson, Robert; Frank, Clifford; and Love, Steve.
"Savings Through Power Control," The Manufacturing Confectioner, vol. 55, no. 9, pp. 29-33.

How the IBM System/7 computer system can improve control of electrical power usage. The user specifies the desired maximum level of power and the System/7 selects specific groups of noncritical equipment to be turned off (such as fans), making decisions as to the duration of the cycle.

Bataille, G.S.
"Stop Wasting Energy! Some Practical Ideas on How to Do It," Plant Engineering, vol. 28, June 13, 1974, pp. 137-139.

Case studies of energy waste in plants and the method of correcting it are given. Written for plant manager level.

Berg, Charles A.
"Conservation in Industry; Fuel Conservation Through Improved Fuel Efficiency," Science, vol. 184, no. 4134, April 19, 1974, pp. 264-70.

Believes industry should reexamine technical measures that have been available in the past in order to improve fuel efficiency. Describes and discusses the following capital projects that offer fuel savings: insulation of heat-treating furnaces, industrial furnace efficiency and heat recuperation, on-line computer controls, and accelerated adoption of improved equipment.

Curi, Robert S.
"Energy Conservation Checklist for Industry," American Gas Association Monthly, vol. 56, no. 2, February 1974, pp. 18-20+.

Discusses some of the larger and more easily detectable sources of heat, steam, air, gas, oil and electricity waste in industrial operations and outlines methods to resolve the problems. Specific areas covered include flue gas temperature, excessive combustion air supply, combustion chamber leakage, make up air heating, and others.

"Curtailable Service Rates Can Cut Peaks," Electric World, vol. 184, no. 7, pp. 68-69.

Discusses the details of electric service curtailment at the discretion of power companies to cut load peaks and reduce utility bills. This reduced reliability service might be acceptable to many industries where the cost of electricity is high relative to labor and capital costs and might be acceptable if the product or material in process can be stored to keep other parts of the plant in operation.

"Demand Control Trims Electric Bills," Automation, vol. 21, August 1974, pp. 69-71.

Industrial electric bills are a function of: (1) total energy consumed and (2) highest or peak demand for power at any time during the billing period. Demand control reduces electric bills by decreasing controllable loads during heavy demand periods. Automatic demand control can save the most in the long run.

"Dent Hails U.S. Industry's Good Start in Saving Energy; Calls for Continuing Effort," Commerce Today, vol. 4, May 27, 1974, p. 17.

Dent mentioned the use of a computer program to "retrofit" existing structures with such items as solar collectors, absorption air conditioners, heat pumps, and building shell improvements.

"A Do-It-Yourself Oil Reclaimer," Factory, vol. 7, no. 8, August 1974, pp. 35-36.

How to build an oil reclaimer in your own plant, with your own materials, thereby reducing plant oil purchases, saving on oil disposal costs, and generally conserving petroleum products.

Dow Chemical Company.
The Technical Aspects of the Conservation of Energy for Industrial Processes. Prepared by James R. Burroughs. Midland, Michigan: The Dow Chemical Company, 1973. 164 pages. Available from the Dow Chemical Company, Midland, Michigan 48640.

Gives energy cost projections for the different fuels, and conservation programs and guidelines for unit processes, plant equipment, plant facilities, and power and heat generation.

"Electric Positioning Devices = Energy Savings," Electrified Industry, vol. 39, no. 8, August 1975, p. 20.

"A manufacturer's report on the use of electric actuating devices in an automated materials handling line at Weldmation, Inc., Madison Heights, Michigan."

"Energy Conservation Recommendations for Business and Industry," Heating/Piping/Air Conditioning, vol. 46, March 1974, pp. 37-38.

Reviews the recommendations in the Hartford Steam Boiler Inspection Insurance Company's energy conservation kit and the Pennsylvania Department of Commerce report on energy conservation in business and industry.

"Energy Management Digest: Industrial Energy Kit," Commerce Today, vol. 4, May 27, 1974, p. 13.

Reviews the National Industrial Energy Conservation Council's (NIECC) kit to help industries conserve energy. The kit, "How to Profit by Conserving Energy," should help manufacturers choose low energy-content raw materials and pinpoint prime energy-consuming machines.

"Energy - The Third Winter," General Foods News, December 1975/January 1976, pp. 15-17.

Equipment modifications General Foods Corporation has taken in the past two years to convert to a dual firing capability.

"For Efficient Energy - Dollar Use," Electrified Industry, vol. 39, no. 8, August 1975, pp. 10-11.

A unique facility for storing "cold Btu's" until needed for the comfort conditioning system and a demand monitor that assures efficient use of energy are combined for economical operation at Scientific Atlanta in Georgia.

"Improving Plant Power Factor," Factory Plant Operating Management, vol. 8, January 1975, pp. 47-49.

To decrease plant electric bill, the power factor should be as near 1 as possible. To reduce the reactance of inductive equipment, appropriate capacitance should be added to these circuits. Tells how to compute capacitance required.

"Industrial Trade Associations Joining Systematic, Voluntary Energy Conservation Program," Commerce Today, vol. 5, January 6, 1975, pp. 13-14.

If industry leaders will raise energy management to a high priority, do a good energy audit, and create employee awareness of the need to conserve energy, they can achieve substantial savings.

"Industry Associations Map Energy Moves for Members," Commerce Today, vol. 4, April 29, 1974, p. 17.

Describes an energy conservation pamphlet by the National Canner's Association which tells how to save energy in phases of canning plant operation, and the National Electrical Manufacturers Associations' "Total Energy Management Program" which stresses the energy audit, monitoring all energy used to see where reductions might be effected.

"It All Helps: What GF Units are Doing to Conserve Energy," General Foods News, vol. 35, no. 1, December 1973/ January 1974, pp. 12-13.

Highlights of steps General Foods Corporation has taken to conserve energy in their operations. Includes converting to coal, condensing spent steam into hot water,

greater use of insulation, and recycling scrap plastic. Includes a glossary of energy terms.

Jefferson, E.G.
"Energy Management In Industry," Conference Board Record, vol. 11, May 1974, pp. 37-39.

Ways E.I. DuPont de Nemours and Company have conserved energy. Sixty percent of their savings were in combustion efficiency, effective use of steam turbines, decreasing avoidable energy losses and waste energy recovery. Other opportunities for saving are also given.

Lawler, Frank K.
"Planning Ahead to Save Energy," Food Engineering, vol. 46, no. 1, January 1974, pp. 67-69.

Gives practical energy saving measures for the food processing industry. Covers the areas of processing, plant services, products and packages, and transportation.

Marks, C.H.
"Program for Energy Management," Plant Engineering, vol. 28, May 16, 1974, pp. 125-127.

A basic energy management program is described for a processing plant. Contains a checklist and describes the management steps for program implementation. The article contains a typical job description for an energy administrator and an outline for an energy conservation training program.

"Proven Ways to Save Energy in Industrial Plants," Heating/Piping/Air Conditioning, vol. 47, May 1975, pp. 58-63.

Suggestions included in the areas of lighting, exhaust fans, ovens, fortlift engines, heat and smoke relief vents, compressed air leaks, air-using equipment, furnaces, paint booths, washers, boiler plants, and solid waste.

Resource Planning Associates.
Energy Management Case Histories. Cambridge Mass: Resource Planning Associates, 1975. 18 pages. Paper copy $3.25/microfilm $2.25. NTIS #PB-244 908/0WE. Available from the National Technical Information Service.*

This report illustrates industrial energy conservation case experiences by four U.S. firms: Raytheon Company, Chemetron Corporation, Chesebrough-Ponds, Inc., and Behrenberg Glass Company. It discusses how they organized to achieve results, how they implemented their energy saving projects and what the results of their efforts were.

"Steps to Conserve Energy Will Affect All Employees," CANDID, November 9, 1973, p. 1+.

Steps General Foods Corporation took during the initial petroleum product shortage to conserve energy in their operations, plus measures their employees could take to conserve energy in their homes and automobiles.

U.S. Department of Commerce, Office of Energy Programs.
Energy Conservation Handbook for Light Industries and Commercial Buildings. Washington, D.C.: Government Printing Office, 1974. 17 pages. $0.35. For sale by the Superintendent of Documents, U.S. Government Printing Office.*

Gives detailed suggested guidelines for surveying energy conservation opportunities in a given plant and suggests possible corrective measures to be applied. Also discusses general areas of energy conservation including building heat, combustion equipment adjustment, effective process control, and modification of equipment.

U.S. Department of Commerce, Office of Energy Programs.
Energy Conservation Program Guide for Industry and Commerce (EPIC). (SD Catalog No. C 13.11:115.) $2.50. Available from Superintendent of Documents, U.S. Government Printing Office.*

One hundred and eighty energy conservation opportunities. Provides engineering data and conversion factors pertinent to energy conservation, sources of

technical assistance in energy conservation, series of checklists and procedures for monitoring energy consumption and conservation progress, and a section on techniques and equipment for measuring energy-related flows.

U.S. Department of Commerce, Office of Energy Programs. "How to Profit by Conserving Energy: A Do-It-Yourself Kit for Industry." 5 pages. Free. Available from the Office of Energy Programs, Department of Commerce.*

Energy calculator to determine energy content in Btu's per unit for any kind of manufactured or processed product. This yardstick can be used to measure progress to determine if energy reduction goals are being met, exceeded, or missed.

U.S. Department of Commerce, Office of Energy Programs. Thirty-Three Money-Saving Ways to Conserve Energy in Your Business. Washington, D.C.: Government Printing Office, 1974. 6 pages. $0.25. Available from the Superintendent of Documents, U.S. Government Printing Office.*

Outlines specific energy-saving steps in the areas of heat confinement, scheduling, heat recovery, proper equipment and maintenance for both space conditioning and industrial processes.

U.S. Federal Energy Administration. Energy Conservation Volume III — Energy Conservation in the Manufacturing Sector. Washington: Government Printing Office. (GPO Stock Number: 418-00040). $5.40. Available from the Superintendent of Documents, U.S. Government Printing Office.*

Details present levels of consumption, the projected growth of this consumption under several energy price assumptions, and the potential for reducing this growth by various means.

Wright, A. "Keeping That Electric Power Bill Under Control," Plant Engineering, vol. 28, June 13, 1974, pp. 143-145.

Instruments and techniques for measuring energy use and demand in a small to medium sized plant are discussed.

2. MEAT PRODUCTS

American Association of Meat Processors.
"The High Cost of Energy is Here to Stay... So Plan Your Conservation Efforts Now," AAMPlifer (newsletter), vol. III, no. 3, February 1975, pp. 4-5. Free. Complimentary copy available from the American Association of Meat Processors, 224 East High Street, Elizabethtown, Pennsylvania 17022.

Details steps small processors and locker and freezer provisioners can take to conserve energy in the areas of hot water, refrigeration, utilities and others.

3. DAIRY PRODUCTS

No publications could be located specifically for this sector.

4. CANNED AND PRESERVED FRUITS AND VEGETABLES

National Canners Association.
Energy Conservation in the Canning Industry. Bulletin 36-L. Washington, D.C.: National Canners Association, 1974. 15 pages. $0.50 per copy with a $2.00 minimum order. Available from the National Canners Association, 1133 20th Street, N.W., Washington, D.C. 20036.

This bulletin gives details on possible energy-saving techniques for the canning industry. It urges canners to identify energy uses and establish programs for maximum energy efficiency. It also describes ideas being used by a number of canning plants and includes information from canning equipment suppliers. Gives specific tips in the areas of housekeeping operations, boiler and power plant operations, raw products handling and cleaning, processing equipment and operations, transportation, and equipment maintenance.

5. GRAIN MILL PRODUCTS

Maness, James E.
Energy Savings for Grain and Feed Industry. Washington, D.C.: National Grain and Feed Association, 1975. 18 pages. Free. Available to industry members only. Write the National Grain and Feed Association, 500 Folger Building, 725 15th Street, N.W., Washington, D.C. 20005.

Energy conservation guide. Tells how to develop an energy saving program, what energy saving areas should be considered, and where to look for energy savings. Gives a detailed list of energy saving ideas for the grain and feed industry. Also lists commonly used conversion factors.

6. BAKERY PRODUCTS

No publications could be located specifically for this sector.

7. SUGAR AND CONFECTIONERY PRODUCTS

No publications could be located specifically for this sector.

8. FATS AND OILS

National Cottonseed Products Association, Inc.
"Recommended Ways to Conserve Energy in the Cottonseed Oil Milling Industry." 1975. 2 pages. Available from the National Cottonseed Products Association, Inc., P.O. Box 12023, Memphis, Tennessee 38112.

Twenty-five methods for reducing energy consumption in the cottonseed oil milling industry.

9. BEVERAGES

National Soft Drink Association.
A Guide to Energy Conservation for the Soft Drink Manufacturer. Washington, D.C.: National Soft Drink Association, 1974. 19 pages. $0.70 — single copy. (Quantity prices on request.) For sale by the National Soft Drink Association, 1101 16th Street, N.W., Washington, D.C. 20036.

Practical suggestions for energy conservation in the areas of buildings and grounds, operations, delivery and transport and sales. Includes suggested forms for conducting an energy audit.

"Southeastern MBAA Salutes Spring in 'Energy Crisis' Panel," Modern Brewery Age, vol. 25, no. 13, April 1, 1974, p. 2.

Ways the brewery industry can save energy in three areas: hot water, fuel and electricity. Recommendations include reducing water temperatures, efficient use of boilers and monitoring conveyors for shut-off when not in active operation.

"Utility Flow Measurement Needed," Modern Brewery Age (Magazine Section), vol. 25, no. 16, April 22, 1974, p. 145-24.

The need to monitor the flow of utility fluids in the brewing industry is not well recognized. Measurement is imperative to minimize usage, to eliminate losses, and to detect inefficiencies. The costs and benefits of different flow meters are discussed and typical savings from a packaged flow measurement system are given.

10. MISCELLANEOUS FOOD PREPARATIONS AND KINDRED PRODUCTS

No publications could be located specifically for this sector.

11. COOLING SYSTEMS

Farwell, W.
"More Cooling at Less Cost," Plant Engineering, vol. 28, August 22, 1974, pp. 85-7.

A two-stage absorption chiller is claimed to reduce energy consumption of a single-stage water chiller by at least 30 percent at full load, and by as much as 40 percent when operating on partial load.

"A New Approach to Factory Air Conditioning," Heating/Piping/Air Conditioning, vol. 46, June 1974; pp. 45-49.

Spot cooling approach cools workers, not the plant. Install intake and outlet near workers. Isolate high heat sources.

12. HEATING AND HEAT RECOVERY SYSTEMS

"Continuous Boiler Blowoff: More Reasons Now Than Ever," Factory, vol. 8, no. 9, September 1975, pp. 19-20.

Well designed continuous boiler blowoff systems are necessary for efficient boiler operation, save fuel and pay for themselves quickly. Tells how to avoid the concentration of mineral salts that cause "foaming" and deterioration of steam quality by clogging tubes and lines and scaling turbine blades. Automatic continuous boiler blowoff systems involve the transfer of heat from blowdown water to feed water before the blowdown is discharged to waste. This increases heat recovery and commensurately lowers fuel consumed.

"'Heat Pump' Can Recycle Industrial Heat," Electric World, vol. 183, no. 10, May 15, 1975, pp. 68-69.

Energy conservation can be increased by recycling low temperature industrial energy sources. Adding thermal storage to the system can minimize utility peak loads and improve load factor. Discusses the Westinghouse Templifier (temperature amplifier) which uses a water-to-water heat transfer system, and the system applications in many sectors of the food system, especially where process steam is used.

"Heating With Less Combustion Fuel," Factory, vol. 7, no. 10, October 1974, p. 60.

How to decrease combustion fuel consumption up to 15 percent without major equipment or layout modifications. Discusses scientific scheduling of furnace startup, instrumentation on furnaces and ovens, control of air intake, efficient heat flow and furnace size.

Kerr, E.W.
"Waste Fuel Drying and the Energy Crisis," Sugar Journal, vol. 37, no. 10, March 1975, pp. 40-47.

The theory and experiments conducted in 1910 that investigated the potential benefits of using waste smoke-stack heat for drying bagasse on its way to the boiler are summarized. The important discovery that the actual increase in heat value (boiler evaporation) due to fuel drying in these tests was twice the calculated increase, was neglected in later research and boiler design. Therefore, the editor implies that this discovery may still have potential for upgrading existing boilers and redesigning new boilers.

Meister, R.A.
"Some Recommended Practices for Heating Fuel Conservation," Plant Engineering, vol. 28, July 11, 1974, pp. 92-93.

Sources of heating fuel energy waste are identified and discussed.

"Planned for Efficient Energy Use," Electrified Industry, vol. 39, no. 8, August 1975, pp. 7-9.

"Heat recovery from process heating plus steam from two high voltage electrode boilers provide efficient use of energy in the DeKalb, Illinois facility of A.O. Smith Harvestore Products, Inc."

Schwieger, R.G.
"Air Preheater Can Help Reduce Fuel Costs, Data Sheet." Power, vol. 119, January 1975, p. 12.

Potential gross fuel cost savings that can be achieved by installing a regenerative-type air preheater on a conventional industrial boiler are shown in a series of charts.

Sternlicht, Beno.
"The Equipment Side of Low-Level Heat Recovery," Power, vol. 119, no. 6, June 1975, pp. 71-77.

The techniques and economics of low-level heat recovery are discussed. Techniques range from the simple heat exchanger to the Ranbine cycle.

"Switching From Steam to Hot Water," Factory, vol. 8, no. 8, August 1975, pp. 43-45.

Fuel and maintenance cost savings are among the advantages of a hot water heating system over steam. Others include no flashing, control ease and greater heat capacity. Mathematically shows how hot water heating can lower fuel requirements by 19.8 percent over steam.

"Where It May Not Pay to Save Energy," Factory, vol. 8, no. 8, August 1975, pp. 46-49.

Heat recovery equipment may, or may not, be a way to lower full consumption. Evaluation of existing operating conditions in a particular process or piece of equipment is the first step toward making improvements that will do the greatest and most immediate good. Discusses operating efficiency, heat recovery, installation and economic feasibility.

13. BUILDINGS

"Building With Energy in Mind," Factory, vol. 7, no. 8, August 1974, p. 19.

Tips that cut energy use — particularly in metal buildings.

14. INSULATION

"Save Energy With This New Way to Calculate Insulation Thickness," Food Engineering, vol. 46, February 1974, p. 96.

Heat-using processing plants can combat energy shortage by taking the guesswork out of specifying thermal insulation for pipes. The system described can be used to determine the amount of insulation that produces the lowest possible sum of the annual cost of heating and the cost of insulation.

15. LIFT TRUCKS

"How to Save Industrial Lift Truck Fuel," Factory, vol. 7, no. 11, November 1974, pp. 37-38.

Tips on how to cut down on the fuel consumption of nonelectric industrial lift trucks. Discussion includes fuel choice for maximum engine efficiency, air cleaner maintenance, engine carburetion factors and pressure relief settings for the hydraulic system.

"How to Conserve Lift Truck Fuel," Plant Engineering, vol. 28, April 4, 1974, pp. 54+.

Lift truck fuel consumption is affected by maintenance practices, driver attitudes, and scheduling procedures. Recommended maintenance practices are described for engine-powered trucks and special tips for electrics are given.

III. WHOLESALE TRADE

This sector includes establishments or places or business primarily engaged in selling merchandise to retailers; to industrial, commercial, institutional, farm, or professional business users; or to other wholesalers; or acting as agents or brokers in buying merchandise for or selling merchandise to such persons or companies. The principal types of establishments included are: (1) merchant wholesalers — who take title to the goods they sell; (2) sales branches and sales offices (but not retail stores) maintained by manufacturing enterprises apart from their plants for the purpose of marketing their products; (3) agents, merchandise or commodity brokers, and commission merchants; and (4) assemblers, buyers, and associations engaged in the cooperative marketing of farm products.

III. WHOLESALE TRADE

1. GENERAL

Powell, Richard M.
"Thirty-Nine Ways to Conserve Warehouse Energy Without Jeopardizing Frozen Quality," Frozen Food Age, vol. 22, no. 9, April 1974, pp. 55-56+.

Thirty-nine steps which have been taken in the public refrigerated warehousing industry to conserve energy Tips cover lighting, temperature, battery charging, elevators, freezer doors, blowers, oil separators, heat pressure on compressors, evaporative condensors, heat reclamation, and others.

2. GROCERIES, GENERAL LINE

No publications could be located specifically for this sector.

3. FROZEN FOOD

Bowersox, Donald J.
"Guide to Marketing and Distribution in an Energy Deficient Economy," Frozen Food Age, vol. 23, no. 8, March 1975, pp. 40-43.

Discusses three areas of energy conservation that can benefit packers, warehousemen, distributors, retailers and brokers. These areas are: (1) improved shipment consolidation, (2) improved inventory consolidation, and (3) postponement of coordinated distribution effort.

4. DAIRY PRODUCTS

No publications could be located specifically for this sector.

5. POULTRY AND POULTRY PRODUCTS

No publications could be located specifically for this sector.

6. CONFECTIONERY PRODUCTS

No publications could be located specifically for this sector.

7. FISH AND SEAFOOD

No publications could be located specifically for this sector.

8. MEAT AND MEAT PRODUCTS

"AAMP Focuses on Small Plant Problems," The National Provisioner, vol. 173, no. 9, August 30, 1975, p. 12.

Locker and freezer proprietors are advised to purchase higher cost equipment with lower energy efficiency ratio (EER) and to always install double doors. Urethane insulation is currently the preferred insulating material. Sheet metal is the best vapor barrier.

"Insulated Bags Cut Costs of Air Heat Shipments," The National Provisioner, vol. 173, no. 10, September 6, 1975, p. 23.

Insulated 40 cubic inch container used to ship frozen meat via air cuts shipping weight, reduces ice and freight costs. Meat remains frozen although container has been in ambient temperatures for 60 hours.

9. FRESH FRUITS AND VEGETABLES

No publications could be located specifically for this sector.

10. GROCERIES AND RELATED PRODUCTS, NOT ELSEWHERE CLASSIFIED

No publications could be located specifically for this sector.

11 BEER AND ALE

"NBWA Energy Panel Sees Adjustment to Energy Situation," Modern Brewery Age, vol. 25, no. 22, June 3, 1974, pp. 1+.

Briefly notes a variety of energy saving measures that have been initiated by brewery distributors.

12. WINE AND DISTILLED ALCOHOLIC BEVERAGES

No publications could be located specifically for this sector.

IV. RETAIL TRADE

This food system sector includes establishments primarily engaged in selling food for home preparation and consumption. Establishments primarily engaged in selling prepared foods and drinks for consumption on the premises are classified in "Out of Home Consumption." This section also includes stores primarily engaged in selling packaged beers and liquors. Buying of goods for resale to the consumer is a characteristic of retail trade establishments that particularly distinguishes them from the agricultural and extractive industries. For example, farmers who sell only their own produce at or from the point of production are not classified as retailers.

IV. RETAIL TRADE

1. GENERAL

Argintar, H.
"Further Thoughts on Energy Conservation, in the Stores," Stores, vol. 56, October 1974, pp. 14+.

Use of fresh air to cool stores and required adjustments to controls are discussed. Lighting system adjustments for quality control merchandising design are detailed. These include (1) modifying louvered fluorescent troffers by replacing louvers with acrylic refractors set within light-sealed frames, (2) replacing intermediate hi-hats with prismatic refractor type units having twice the fixed aperture, and (3) replacing PAR lamp "spots" with iodine quartz units.

Bermon, H.
"Store Design to Save Energy," Stores, vol. 56, December 1974, pp. 10-11; vol. 57, February 1975, pp. 7+.

The effects of store design on energy consumption and general energy saving techniques are discussed. The economies of installing and operating a heating and cooling system in an open store where partitions do not extend to the ceiling are noted. Replacing fluorescent lamps with more efficient incandescent lamps without loss in lighting quality is discussed.

Commercial Refrigerator Manufacturers Association.
Recommended Guidelines for Retail Food Store Energy Conservation. Washington, D.C.: Commercial Refrigerator Manufacturers Association. (CRMA-EC-1) Reprints are available through the Executive Office, Commercial Refrigerator Manufacturers Association, 1730 Pennsylvania Avenue, N.W., Washington, D.C., 20006.

Specific recommendations for supermarket managers in the areas of existing store construction, new store construction, refrigeration systems, lighting and electrical circuits, and operation and maintenance.

"Energy Crisis is Not Over," Chain Store Age Executive, vol. 51, January 1975, pp. 19-20.

Retailers are taking the energy crisis seriously. Discusses how conversion to fluorescent lighting cuts voltage and how mercury vapor lamps and low-sodium lamps are being used. Suggests putting thermostats where unauthorized personnel can't tamper with them.

"Energy Saving Ideas for Retailers," NARGUS Energy Management Bulletin, no. 3, December 1973. 2 pages. Available from the National Association of Retail Grocers of the U.S., Inc., Suite 620, 2000 Spring Road, Oak Brook, Illinois 60521.

Lists energy saving ideas for retailers in the areas of heating, lighting, and appliances.

"Food Retailers Develop Energy Thrift Methods," Commerce Today, vol. 4, February 4, 1974, pp. 22-23.

Details specific energy-saving actions for food retailers. Action areas include heat reclamation, lighting, thermostat sensors, interior temperature, truck fleets, and others.

"Government Aid Sought for Sambo's Energy Conservation Project," Nation's Restaurant News, vol. 9, no. 18, September 1, 1975, p. 16.

Energy conservation systems being tested include an air conditioning system that utilizes outside air when suitable for cooling the building and an energy reclamation system that uses normally wasted energy for heating, dishwashing, etc.

"Solar Energy: Will Chains and Centers See the Light?" Chain Store Age Executive, vol. 51, July 1975, pp. 200-224.

Case studies of solar energy use. A Florida Winn-Dixie installed a solar water heater to supply hot water to the meat department for washing. A St. Louis project has a solar system that will provide 30 percent of the heating requirements.

Super Market Institute.
Energy Management Guide. Chicago, Illinois: Super Market Institute. 14 pages. Price: $1.00. For sale by the Super Market Institute, 303 East Ohio Street, Chicago, Illinois 60611.

Primary emphasis on energy management in existing supermarkets rather than in new stores. The guide is divided into three sections which emphasize management of energy, maintenance of energy use, and alterations to conserve energy. In addition, a number of measures which would seem to conserve energy but actually cause more energy to be consumed are listed.

"Systems Slash HVAC Costs," Chain Store Age Executive, vol. 51, April 1975, pp. 22-23.

Discusses pros and cons of computerized HVAC systems which reduce peak power demand by turning off unessential equipment. Discusses IBM's, Lennox's, and Honeywell's Supermarket Environment Control Systems. Also gives energy saving techniques for air conditioning systems and refrigerators.

U.S. Department of Commerce, Office of Energy Programs. Energy Management: Economic Sense for Retailers. February 1974. 6 pages. Free. Available from the Office of Energy Programs, U.S. Department of Commerce, Washington, D.C. 20230.

Tells how energy conservation can reduce operating costs and how retailers can reduce energy costs. Includes an energy conservation checklist covering the following areas: heating and cooling, equipment and merchandise, lighting, and transportation and deliveries.

"U.S. Tells Retailers How to Conserve Energy," American Druggist, vol. 171, June 15, 1975, pp. 55-57.

Energy conservation checklist for retailers and business community developed by the Office of Energy Programs of the U.S. Department of Commerce. Covers the areas of heating and cooling, equipment and merchandise, lighting, and transportation and deliveries.

Welham, R.M. "Danks' Energy-Saving Pays Off," Stores, vol. 57, August 1975, pp. 14-15+.

Retail chain store operation in central Pennsylvania curbs electricity consumption in 1974 by 21 percent. The program is outlined.

2. FROZEN FOODS

"CRMA Issues Guidelines for Retailers on How to Save Energy," Frozen Food Age, vol. 22, no. 8, March 1974. pp. 12-27+.

Excerpts Commercial Refrigeration Manufacturers Association's (CRMA) booklet entitled "Recommended Guidelines for Supermarket Energy Consumption" which focuses on frozen food department. Recommendations are divided into five categories: (1) immediate changes that can be implemented, (2) operation and maintenance, (3) commercial refrigeration equipment, (4) store environment, and (5) lighting.

Deckson, Edgar V.
"What This Industry Should Know About Energy and Frozen Foods," Frozen Food Age, vol. 23, no. 6, January 1975, pp. 34-42.

Recommendations for energy use reduction in the frozen food department of retail stores. Discussion covers space utilization, equipment, product display, store environment, lighting, and air flow.

"How to Maintain Proper Temperatures and Still Cut Display Case Energy Costs," Frozen Food Age, vol. 23, no. 8, March 1975, pp. 12-14+.

Answers to a series of frequently asked questions with regard to energy-efficient use of frozen food display cases. Includes discussion on temperature, night covers in open display cases, demand defrost, heat reclamation, frost, maintenance, and legislation.

3. LIGHTING

"Dual Lighting Cuts Costs," Chain Store Age Executive, vol. 51, June 1975, p. 27.

Case study of how a store reduced lighting energy use without blacking out any areas. They combined incandescent and flourescent fixtures on alternate circuits allowing lights to be turned off without blacking out sections of the store. In addition, the incandescent lighting is used in winter to reduce the heating requirement.

"How Reduced Wattage Fluorescents are Saving Energy," Chain Store Age Executive, vol. 51, August 1975, p. 18.

Use of reduced wattage retrofit lamps is suggested. Energy savings of 12-20 percent can be realized with a 10 percent reduction in illumination. These savings are significant; lighting accounts for 30 percent of some older stores electricity usage. When lamps are removed, ballasts get burned.

4. REFRIGERATION

Honeywell Corporation.
"This Desfrost Control Splits Your Electric Bill," Frozen Food Age, vol. 23, no. 3, October 1974, p. 135.

Describes the Honeywell CR70, a defrost control that defrosts freezers only when necessary, requiring less energy than freezers with time-controlled defrost cycling.

"Refrigeration Frost-Sensor Saves Energy," Electric World, vol. 182, August 15, 1974, pp. 76-77.

Traditional timed-defrost cycle removes frost from evaporator coils whether or not conditions require action. Constant monitoring of frost buildup, via sensing of temperature differential across the freezer evaporator coil, gears the defrost cycle to defrost needs and saves energy. In supermarkets, this can save hundreds of dollars per year in electricity costs.

5. TRANSPORTATION

Schwartz, Lloyd.
"Combining Shipments Urged for Efficiency," Supermarket News, vol. 24, no. 34, August 25, 1975.

By consolidating shipments to supermarkets, the number of individual deliveries to an "average" retail grocery store could be reduced from 30 to only 6 per day, resulting in savings of $50 million annually. On promoting backhaul, the report estimates that only 10 percent of food goods are being backhauled by distributors. Standard containers for packing and shipping are also needed to promote efficiency.

* * * * *

Although no publications could be located which specifically apply to individual categories of the food system retail trade sector, those listed in the previous sections of this chapter would be informative. The retail trade sector of the food system is broken down into the following categories by the Department of Commerce's Standard Industrial Classification Manual:

- Miscellaneous General Merchandise Stores
- Grocery Stores
- Meat and Fish (Seafood) Markets, Including Freezer Provisioners
- Fruit and Vegetable Markets
- Candy, Nut and Confectionery Stores
- Dairy Products Stores
- Retail Bakeries
- Miscellaneous Food Stores
- Miscellaneous Retail.

V. CONSUMPTION - IN-HOME PREPARATION

The residential sector of the food system consumes a significant amount of energy for food preparation. Major in-home energy consumption occurs in storing food (refrigeration and freezing) and in preparing food for consumption (ranges, ovens, and small appliances).

V. CONSUMPTION - IN-HOME PREPARATION

1. GENERAL

American Gas Association.
Money to Burn. Catalog No. G22273. $0.10. Available from Order and Billing, American Gas Association, 1515 Wilson Boulevard, Arlington, Virginia 22209.

Consumer's guide to energy conservation.

Coffee, F.
"Now! Energy-Saving Appliances," Mechanix Illustrated, vol. 71, January 1975, pp. 64-65.

Energy saving features in new models of refrigerator-freezers, ranges, microwave ovens and dishwashers.

Council of Better Business Bureaus, Inc.
Tips on Saving Energy. U.S.A.: Council of Better Business Bureaus, Inc., 1975. 10 pages. Available from the Council of Better Business Bureaus, Inc., 1150 17th Street, N.W., Washington, D.C. 20036.

Energy saving tips for the homeowner. Includes techniques for saving energy in cooking, the family car, and appliances. Lists electric energy usage for many appliances.

Energy Conservation Research.
The Energy Crisis: What Can We Do? Malvern, Pa.: Energy Conservation Research, 1974. 29 pages. Available from Energy Conservation Research, 9 Birch Road, Malvern, Pennsylvania 19355.

Tips on how to conserve energy in the home. Includes heating and cooling your home, heating water, preserving food, cooking, dishwashers, lighting, small appliances and automobile use.

"The Energy Crisis: Let's Call it a Challenge — Until 1980," Appliance Manufacturer, vol. 23, no. 3, March 1975, pp. 39-43.

Mentions a Westinghouse CT-2 cool/heat induction range for surface cooking which uses 25 percent less energy for common cooking tasks. Waste heat is removed by a special duct system. Also discusses a refrigerator with a power economizer switch to cut off cabinet heaters in low humidity conditions which saves 15 percent of normal power use.

"Energy Management Digest: Energy-Wise Buying Practices," Commerce Today, vol. 4, no. 16, May 13, 1974, p. 13.

Dr. John H. Gibbons, Director of the Federal Energy Office's energy conservation unit advises consumers to "Buy durable products." This saves energy by avoiding early replacement.

"Energy Management Digest: Kitchen Tips," Commerce Today, vol. 5, February 17, 1975, p. 12.

Tips on how to save energy when baking, refrigerating leftovers and liquids, shopping and others.

"Energy Utilization Efficiency of Major Home Appliances," American Gas Association Monthly, vol. 55, no. 10, October 1973, pp. 12-14.

Focuses on appliance efficiency as measured by the consumption of primary fuels. Tables give efficiency of supplying energy (natural gas and electric power) to the consumer and comparative efficiencies and operating costs of gas and electric appliances.

"Family Alert for Energy Conservation," American Gas Association Monthly, vol. 56, March 1974, pp. 4-6.

Review of energy conservation tips included in the "ALERT-Family" programs sponsored by local gas companies. Includes specific tips on how to save energy in cooking.

"How to Cut Fat Out of the Home Energy Budget," American Gas Association Monthly, vol. 56, September 1974, pp. 16-20.

Includes tips on saving energy in the kitchen and how to compute the energy use (in watts) of appliances.

Pifer, Glenda.
"Energy Conservation In and Around the Home," Family Economics Review, ARS-NE-36, spring 1974, p. 16.

Refrigerators and freezers will use less energy if located away from the range, hot-air register, or other heat sources. Provides other specific energy conservation practices for refrigerator, range and oven use.

President of the United States.
Citizen Action Guide to Energy Conservation. Prepared by the Citizen's Advisory Committee on Environmental Quality. Washington, D.C.: U.S. Government Printing Office, 1973. G.P.O. No. 4000-00300. 64 pages. $1.75. Available from the Superintendent of Documents, U.S. Government Printing Office.*

Explains to the average citizen what energy conservation means. It includes three specific action checklists: transportation, household, and industry and electric utilities. It also tells citizens how they can change industrial and commercial practices that waste energy.

U.S. Federal Energy Administration.
Como Economizar Energia y Dinero en Su Hogar. (031-A). Free. Available from FEA.*

"How to Save Energy and Money in Your Home." Tips for Energy Savers in Spanish.

U.S. Federal Energy Administration.
Save Energy. 1 page. (084-D). Free. Available from FEA.*

Urges energy conservation by insulating homes, observing 55-mph speed limit, and so forth. Gives brief explanation of Project Independence.

U.S. Federal Energy Administration.
Save Energy (Spanish). 1 page. (083-D). Free. Available from FEA.*

Same as above, except in Spanish.

U.S. Federal Energy Administration.
Tips for Energy Savers. 32 pages. Single copies available free from Consumer Information, Dept. FE, Pueblo, Colorado 81009.

Recommends practical ways to conserve energy around the home and in the automobile. Gives hints for buying energy-efficient merchandise.

U.S. Federal Energy Administration.
Tips for Energy Savers In and Around the Home, On the Road, In the Marketplace. Prepared by Office of Energy Conservation and Environment. Washington: U.S. Government Printing Office, 1975. 31 pages. (0-566-806). Available from FEA.*

Energy conservation tips for the homeowner including lighting, refrigerators, cooking, appliances, and transportation.

"Utility Puts Efficiency Label on Appliances," Electric World, vol. 182, October 15, 1974, pp. 102-3.

Baltimore Gas and Electric initiated a program labeling the energy use of all electrical appliances they sell. This enables customers to use a life-cycle costing approach for appliance purchases.

"We've Been Asked: How to Save Fuel at Home," U.S. News and World Report, vol. 75, December 17, 1973, pp. 19-20.

Energy saving ideas included for the following areas: ovens, electric burners, self-cleaning ovens, and refrigerators.

2. REFRIGERATION AND FREEZING

Association of Home Appliance Manufacturers.
AHAM Directory of Certified Refrigerator-Freezers. Chicago: Association of Home Appliance Manufacturers, published twice a year. 18 pages. $0.50 a single copy; can be ordered on a subscription basis. Available from the Association of Home Appliance Manufacturers, 20 North Wacker Drive, Chicago, Illinois 60606.

Lists over 1,000 currently available certified models of refrigerator-freezers. Gives the average monthly energy consumption of each in kilowatt hours as well as the volume and shelf area.

Association of Home Appliance Manufacturers.
Facts on Energy Use and Conservation for Refrigerator-Freezers. Chicago: Association of Home Appliance Manufacturers, 1974. 9 pages. $0.25. Write Association of Home Appliance Manufacturers, 20 North Wacker Drive, Chicago, Illinois 60606.

Explains what factors affect the energy consumption of refrigerator-freezers and how consumers can save energy through proper use.

3. COOKING

American Gas Association.
A Consumer's Guide to Energy Conservation With Natural Gas. 15 pages. (Catalog No. 101974) $0.10. Available from the American Gas Association, 1515 Wilson Boulevard, Arlington, Virginia 22209.

How to save energy and money with natural gas. Covers gas heat, ranges, water heaters, dryers and air conditioning and how to conserve energy in their use.

Butel, J.
"Does Microwave Cooking Save Energy?" Electric World, vol. 183, May 1, 1975, pp. 62-63.

Yes and no. The microwave oven is more efficient than conventional stove top or oven methods in cooking some foods; however, conventional methods are more efficient when cooking others. Tells which foods are best cooked by each method.

"An Energy Consumption Test-imonial," American Gas Association Monthly, vol. 56, July/August 1974, pp. 22-23.

The American Gas Association conducted tests to measure energy consumption for cooking and pilot lighting on gas-fired appliances. About 30 percent of daily gas use for a modern gas range goes to keep the pilot burning. Cooking technique had a significant bearing on the amount of gas used. Preheat time and degree of doneness are important factors.

4. SELECTED SMALL APPLIANCES

No publications could be located specifically for this sector.

VI. CONSUMPTION - OUT-OF-HOME PREPARATION

This major group includes establishments selling prepared foods and drinks for consumption on the premises for immediate consumption, and for off-premise consumption. It includes restaurants, lunch counters, and drinking places operated as a subordinate service facility such as those operated by hotels and department stores.

VI. CONSUMPTION - OUT-OF-HOME PREPARATION

1. EATING PLACES

Clark, Jack.
"Utilities Management: Part I - Shedding Light," Cornell Hotel and Restaurant Administration Quarterly, vol. 16, no. 1, May 1975, pp. 14-23.

Includes specific suggestions for utility management in low, medium, and high cost range. Recommends management program with energy audit and energy scoreboard to motivate personnel. Gives recommended footcandle illumination levels for restaurants, kitchens, bars, parking lots, and others.

"To Conserve Energy: Audit Your Bills - Part II," Restaurant Business, vol. 74, no. 2, February 1975, p. 56.

Discusses the benefits of restaurant owners and managers auditing their utility bills.

"To Conserve Energy: Teamwork Counts - Part I," Restaurant Business, vol, 74, no. 1, January 1975, p. 31.

Advice for restaurant owners who want to develop their own energy conservation programs. No specific energy conservation techniques given but lists the first steps to take in setting up a program.

"Dunkin Donuts Plan Aims for Energy Slash," Nation's Restaurant News, vol. 9, no. 3, February 3, 1975, p. 1+.

Program designed to cut utility bills by 10 percent during the heating season and by 24 percent during the cooling season through (1) insulating ceiling and ventilating attic, (2) installing damper in store's air conditioning unit, (3) installing outside air dampers, (4) insulating exterior walls, and (5) installing sun screens.

"Good Idea Goes a Long Way to Save Energy," Institutions/ Volume Feeding Management, vol. 74, May 1, 1974, p. 69.

Conservation tips included for the following areas: lighting, heat and steam tables, oil burner, water heating, water heat exchangers, cooling, enthalpy control systems, hot-air intake, thermostats, and windows.

"How to Cut Energy Costs: Some General Rules - Part I," Restaurant Business, vol. 74, no. 6, June 1975, p. 62.

Guidelines compiled by the Hobart Corporation to help restaurant operators use energy more efficiently.

"How to Cut Energy Costs: Tremendous Savings Can Be Found in Existing Structures," Restaurant Business, vol. 74, no. 9, September 1975, pp. 95 and 99.

Interview with Richard Graves, Director of the Johns Manville Insulation Center in Denver. Discusses an energy audit survey the center completed for McDonald's Corporation. Gives energy conservation steps a restaurant owner can take. Covers insulation and lighting.

"Making News: Soy Bicentennial, Energy Savings," Institutions/Volume Feeding Management, vol. 76, no. 7, April 1, 1975, p. 57.

Tips from the National Restaurant Association and the Federal Energy Administration on ways to save energy.

Midwest Research Institute.
Energy Management and Energy Conservation Practices for the Food Service Industry. Prepared for the National Restaurant Association. Kansas City, Missouri: Midwest Research Institute, 1974. 39 pages. Available from the National Restaurant Association, One IBM Plaza, Suite 2600, Chicago, Illinois 60611.

This report presents energy conservation guidelines and energy management techniques which restaurant operators can utilize to reduce energy consumption in their operations. It covers program methodology for restaurant operation, savings being realized, and conservation guidelines. It also includes a checklist for energy control and conservation.

National Restaurant Association.
"Checklist for Energy Control and Conservation," 4 pages. Available from the National Restaurant Association, One IBM Plaza, Suite 2600, Chicago, Illinois 60611.

An energy conservation checklist covering equipment and equipment installation, operating procedures, maintenance and repair, physical facilities, and general and administrative areas.

Raskin, B.
"1974 Institutions Equipment Census: Kitchen Economy; What Would You Do if Energy Costs Rose to $2 an hour?" Institutions/Volume Feeding Management, vol. 74, March 15, 1974, pp. 39-47.

Long list of tips on how to conserve energy.

"Sambo's Pioneers Energy Research," Institutions/Volume Feeding Management, vol. 77, no. 3, August 1, 1975, pp. 42-45.

Sambo's restaurant in Calabasas, California is experimenting with advanced energy-saving systems: (1) energy reclamation, (2) energy conservation, (3) solar energy collection, (4) heat exchangers, and (5) make-up air systems.

"Sharp Eye Can Slash Energy Bite by 30 Percent," Institution/Volume Feeding Management, vol. 75, no. 8, October 15, 1974, p. 43.

Simple methods for conserving energy.

2. DRINKING PLACES

No publications could be located specifically for this sector.

3. OTHER

U.S. Department of Commerce, Office of Energy Programs. Energy Management in Health Care Institutions. Washington, D.C.: Government Printing Office, 1975. 9 pages. $0.35. For sale by the Superintendent of Documents, U.S. Government Printing Office.*

Outlines energy management program whereby health care institutions can conserve energy and cut operating costs. Explains how to start an energy management program and how to measure energy use. Includes an energy conservation checklist and lists professional resources that can provide assistance.

4. EQUIPMENT AND APPLIANCES

American Gas Association. Energy Conservation and Economy Handbook for Commercial Uses. 34 pages. (Catalog No. 500675) $0.50. Available from the American Gas Association, 1515 Wilson Boulevard, Arlington, Virginia 22209.

This publication urges the use of gas appliances to save energy. Energy ratios comparing the energy used by gas and electric commercial appliances (e.g., deck ovens, fryers, steamers, ranges, etc.) are given. This energy usage ratio is computed from total original energy in the gas, coal or oil and includes transmission or conversion losses. In terms of total energy efficiency, gas is a more efficient source of heat than electricity.

American Gas Association. "Maintenance Tips That Will Help Conserve Energy and Improve Your Food Service Operation." 3 pages. Catalog No. R01023. $0.20. Available from the American Gas Association, 1515 Wilson Boulevard, Arlington, Virginia 22209.

Lists appliances, what to look for, how often to clean/maintain, what to do, and general pointers.

Cooking for Profit. 1975 Profit Guide. Madison, Wisconsin: Cooking for Profit, 1974. 70 pages. Price: $2.00. For sale by Cooking for Profit, 1202 South Park Street, Madison, Wisconsin 53715.

Buyers guide for foodservice equipment. Equipment description includes Btu input.

The Electrification Council.
How to Get Maximum Performance From Your Electric Warewashing Equipment. New York, New York: The Electrification Council. 5 pages. Publication No. 75TEC975. Available from the Electrification Council, 90 Park Avenue, New York, New York 10016.

Covers choosing warewashing equipment, types of warewashing machines, warewashing problems and cures, cleaning and maintenance, and temperature and pressure control.

"Ventilating and Air-makeup Systems," Restaurant Business, vol. 74, no. 7, July 1975, pp. 58-66+.

The latest air-makeup and ventilating systems can reduce the amount of energy consumed by reducing the amount of exhausted air.

5. COOKING

American Gas Association.
Saving Energy in Commercial Gas Kitchens. 9 pages. (Catalog No. R01025) $0.20. Available from the American Gas Association, 1515 Wilson Boulevard, Arlington, Virginia 22209.

Energy-saving methods for range cooking, gas broiling and frying, and using gas griddles, ovens, braising pans, steam equipment, and food warming tables.

The Electrification Council.
How to Get Maximum Performance From Your Electric Cooking Battery. New York, New York: The Electrification Council. 4 pages. Publication No. 74TEC973. Available from the Electrification Council, 90 Park Avenue, New York, New York 10016.

Energy saving tips for cooks and bakers in the areas of preheating, fry kettles, ovens, broilers, range-tops, griddles, and steam-jacketed kettles.

"The Speed and Efficiency of Convection Ovens," Restaurant Business, vol. 74, no. 8, August 1975, pp. 79-81.

Convection ovens require less time to preheat to the desired internal temperature and less cooking time due to forced circulation of hot air, thus conserving energy.

6. REFRIGERATION

The Electrification Council.
How to Get Maximum Performance From Your Electric Refrigeration Equipment. New York, New York: The Electrification Council. 3 pages. Publication No. 75TEC974. Available from the Electrification Council, 90 Park Avenue, New York, New York 10016.

Discusses refrigeration in the foodservice, choosing refrigeration equipment, cleaning and maintenance, and energy management techniques.

VII. TRANSPORTATION

Transportation is a significant requirement of the food system. Food products are transported between sectors of the direct producing and consuming activities by:

- Privately owned trucks, trailers, and automobiles
- For hire trucks and trailers
- Railroads
- Airplanes
- Ships and barges.

VII. TRANSPORTATION

1. GENERAL

"The Age of Scarcity — Real but Manageable, General Foods News, vol. 35, no. 2, February/March 1974, pp. 10-11.

How General Foods Corporation is conserving energy in their cars and in the transportation of products.

"Energy Management Digest: Tips for Energy Savers," Commerce Today, vol. 4, no. 13, April 1, 1974, p. 11.

The Federal Energy Office advises buying slightly less than a full tank of gas to prevent overflow waste by allowing for expansion.

"Energy and the Movement of Food," Canner Packer World, vol. 143, no. 4, April 1974, pp. 18-20.

Believes that oceangoing vessels, particularly containerships, and railroads are the most efficient and least energy intensive forms of tranportation of food products.

U.S. Federal Energy Administration.
Energy Conservation Volume II — Project Independence and Energy Conservation: Transportation Sectors.
Washington: Government Printing Office. (GPO Stock Number: 4118-00039) $4.20. Available from GPO.*

Details present levels of consumption, the projected growth of this consumption under several energy price assumptions, and the potential for reducing this growth by various means.

U.S. Federal Energy Administration.
Lower Speed Limits Save Money, Energy, and Lives.
1 page (261-A) Free. Available from FEA.*

Picture story.

2. AUTOMOBILES

American Automobile Association.
Gas Watchers' Guide. U.S.A.: American Automobile Association, 1975. 16 pages. Stock No. 2700. Available from the American Automobile Association, 8111 Gatehouse Road, Falls Church, Virginia 22042.

How to conserve energy in using your car for family business (e.g., shopping), keeping your car in tip-top shape, and good driving techniques.

"Energy Management Digest: Tips for Energy Savers," Commerce Today, vol. 4, no. 14, April 15, 1974, p. 12.

Federal Energy Office advice to motorists on automobile maintenance that increases gas mileage.

"Family-Car Fuel Economy for 1975," American Home, vol. 78, no. 1, January 1975, p. 23.

Lists the Federal Energy Commission's miles per gallon estimates for the top 20 fuel "economy-minded" station wagons for 1975.

U.S. Federal Energy Administration.
1975 Gas Mileage Guide for New Car Buyers. Prepared in conjunction with the Environmental Protection Agency. 20 pages. (227-D). Free. Available from FEA.*

Lists the estimated fuel economy potential of over 350 new car and light-duty truck models and engine combustion designs that meet 1975 emission standards of all states except California. Explains how tests are performed, what factors influence fuel economy, and the importance of fuel economy.

U.S. Federal Energy Administration.
1975 Gas Mileage Guide for New Car Buyers in California. Prepared in conjunction with the Environmental Protection Agency. 16 pages. (244-D). Free. Available from FEA.*

Accomplishes same purpose as 227-D, but with data for California drivers.

U.S. Federal Energy Administration.
Tips for Motorists. 10 pages. Single copies available free from Consumer Information, Department FE, Pueblo, Colorado 81009.

Thirty ways to make gasoline go further. Areas discussed include driving skills, trip planning, maintenance and car care, and awareness of gas usage.

3. TRUCKS

"Fuel Crisis Leads to New Look at Diesel Fleets," Soft Drinks, vol. XCII, no. 1202, January 1974, pp. 40-41.

In light of the fuel crisis, an increasing number of soft drink bottlers and brewers are taking a new look at diesel engines. The inherent advantages of diesel engines include lower fuel consumption, longer life and lower maintenance costs. Recent diesel engine design developments have reduced weight and increased torque rise for faster acceleration without complicated gearing systems. How to compute diesel savings is shown.

4. ROUTE ENGINEERING

"Route Engineering System Can Help Cut Fleet Gasoline Consumption," Soft Drinks, vol. XCII, no. 1202, January 1974, p. 29.

A Computer Assisted Route Development (CARD) program is aiding local delivery fleet operators in reducing their fuel and other costs, sometimes by as much as 28 percent. Economies are realized four ways: (1) increase productivity per mile by increasing loads and reducing the number of routes, (2) improved route organization which reduces overlapping and special deliveries, (3) lowering delivery frequencies and raising minimum order sizes, and (4) find alternative methods of serving customers not served.

"Route Engineering Trims Urban Distribution Costs," Food Engineering, vol. 47, no. 4, April 1975, p. 61.

Describes Computer Assisted Route Development (CARD) system developed by A.T. Kearny & Co. This system, by analyzing and improving distribution route efficiency, can save road mileage and cut drive overtime significantly.

Schrier, Elliot, and Koenigsburg, Ernest.
"To Save Fuel, Model Your Distribution Systems,"
Food Engineering, vol. 46, no. 12, December 1974,
pp. 60-62.

Rising fuel costs demand a new look at how processors transport and distribute food products. Improving point-to-point routings can save some transit energy but rewards can be much greater if distribution is viewed as a system, amenable to analysis both from the standpoint of policy as well as practice. The authors explore this possibility and present a systems modeling concept for controlling energy cost in distribution planning.

VIII. MULTIPLE SECTOR APPLICATIONS

Publications that are applicable to a number of food system sectors are listed in this chapter. Included are energy conservation documents on energy management programs; electricity; heating, ventilating and air conditioning systems; lighting; and refrigeration systems.

VIII. MULTIPLE SECTOR APPLICATIONS

1. GENERAL

American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. ASHRAE Standard 90-75. Energy Conservation in New Building Design. Member - $5.25/ Nonmember - $10.25. For sale by ASHRAE Publications Sales Department, 345 East 47th Street, New York, New York 10017.

Bridges, D.
"Computer Programs Point the Way to Energy Conservation," Heating/Piping/Air Conditioning, vol. 46, January 1974, pp. 93-97.

A typical study for either a new or existing building starts from a base design. Energy saving ideas are then evaluated against this base to determine their economic feasibility. Lists steps an industrial plant can take to reduce energy consumption.

"ECUBE: Service in '74'," American Gas Association Monthly, vol. 56, no. 2, February 1974, p. 17+.

ECUBE (Energy Conservation Using Better Engineering) is an integrated series of computer programs which, when performed for existing or proposed buildings, can determine the energy system which will be most economical over the life cycle of the particular structure, in terms of both money and energy.

"Efficient Combustion Minimizes Fuel Costs," Power, vol. 118, April 1974, pp. 53-56.

An approximate method of calculating combustion efficiency quickly is described.

"Energy Management Digest: Energy Saving Glass," Commerce Today, vol. 5, no. 12, March 17, 1975, p. 15.

Discusses how high performance glass (e.g., insulating, reflective and reflective-insulating glass) can reduce fuel consumption.

"Energy Saving Techniques for Existing Buildings," Heating/Piping/Air Conditioning, vol. 47, January 1975, pp. 98-105.

Techniques: (1) Programmed start and stop of HVAC equipment, (2) Minimize reheat with supply air reset, (3) Reduce lighting levels, air quality, (4) Limit electrical load demand and (5) Convert to variable volume of supply air in accord with load.

"Equipment Maintenance for Energy Conservation," Heating/Piping/Air Conditioning, vol. 47, March 1975, pp. 67-73.

Specific items to check for equipment maintenance to conserve energy. Covers burners, boilers, fittings, compressors, condensors and others.

Gamze, Maurice G.
"A Critical Look at Total Energy Systems and Equipment," Heating/Piping/Air Conditioning, vol. 47, no. 9, August 1975, pp. 43-47.

Detailed review of problems and solutions associated with total energy systems. Discussion confined to systems that generate electricity for buildings and furnish a significant portion of the heating, air conditioning, and process requirements from the heat recovered from prime movers. Also, only specific hardware problems within these systems are discussed. Discusses the state-of-the-art, engine cooling methods, control problems and required research and development.

"General Electric Wins Energy Conservation Competition," Heating/Piping/Air Conditioning, vol. 46, January 1974, p. 30.

Lists General Electric's ideas for energy conservation. Areas include building orientation, lighting, heat recovery, occupancy sensors, and filters.

Gupton, G.W., Jr.
"Readjusting and Rebalancing Air and Water Systems for Energy Savings," Heating/Piping/Air Conditioning, vol. 47, February 1975, pp. 44-47.

Energy conservation suggestions for air and water systems including flow reduction, transmission and infiltration reduction, equipment operation optimization, and others.

"How Industry Is Saving Energy," Automation, vol. 21, September 1974, p. 18.

Report how the business community has responded to the FEA challenge for energy conservation and gives typical techniques they have used.

Monteverde, D.M.
"Control Surface Condenser Cleanliness and Reduce Fuel Use," Power, vol. 118, May 1974, pp. 70-71.

A computer program has been developed to calculate a condenser cleanliness factor so that component performance can be monitored periodically, and various methods of condenser cleaning can be analyzed objectively.

U.S. Department of Commerce, Office of Energy Programs.
Energy Management: Trade Associations and the Economics of Energy. 16 pages Free. Available from the Office of Energy Programs, U.S. Department of Commerce.*

Discussion of energy conservation as it relates to trade association activities. Gives case study and suggests long-term actions for both industrial and commercial trade associations.

U.S. Federal Energy Administration.
Energy Conservation for Existing Buildings, Volume 1. 324 pages (237-D) Free. Available from FEA.*

A manual for building owners and operators.

U.S. Federal Energy Administration.
Energy Conservation Opportunities and Guidelines for Existing Buildings, Volume 2. 444 pages (258-D) Free. Available from FEA.*

Second volume of 237-D.

U.S. Federal Energy Administration.
Energy Conservation, Volume I — Residential and Commercial Energy Use Patterns 1970-1990. Washington: Government Printing Office. (GPO Stock Number: 4118-00038) $3.75. Available from GPO.*

Details present levels of consumption, the projected growth of this consumption under several energy price assumptions, and the potential for reducing this growth by various means.

U.S. Federal Energy Administration.
How Business in Los Angeles Cut Energy Use by 20 Percent. Prepared by RAND for the Federal Energy Administration. 20 pages (210-D) Free. Available from FEA.*

Preliminary results of a RAND study prepared for the Federal Energy Administration, WN-8866-2-FEA, January 1975.

2. ENERGY MANAGEMENT PROGRAMS

American Society of Association Executives.
A Guide to Energy Management: How to Conduct an Energy Audit. Single copy price: ASAE members - $5.00; Nonmembers - $10.00. Available from the American Society of Association Executives, 1101 16th Street, N.W., Washington, D.C. 20036.

Blossom, J.S.
"How to Develop and Implement an Energy Conservation Program," Heating/Piping/Air Conditioning, vol. 47, January 1975, pp. 41-45.

Steps to take in initiating an energy management program.

"Out of Energy-Saving Ideas? Here Are Some EPIC Suggestions (Energy Conservation Program Guide for Industry and Commerce)," Commerce Today, vol. 4, September 2, 1974, pp. 5-7.

EPIC is designed to give companies a step-by-step procedure for setting up and following through on a systematic program of energy conservation. The guide provides a checklist of 180 energy conservation opportunities, in all areas from building and grounds to steam, to process changes. All cases recorded are based on industrial/commercial experience.

U.S. Department of Commerce, Office of Energy Programs. How to Start an Energy Management Program. Washington, D.C.: Government Printing Office, 1973. 6 pages (GPO: 19730-528-532) $0.25. Available from the Superintendent of Documents, U.S. Government Printing Office.*

Describes the whats, whys and hows of an energy management program. Outlines how to organize management resources, conduct an energy audit, set an energy conservation goal, and launch an energy conservation campaign.

3. ELECTRICITY

Cuesta, A.E.
"Using a Minicomputer to Control Energy Costs," Control Engineering, vol. 21, July 1974, pp. 43-44.

Tells how a minicomputer can be used to control peak electricity usage and increase load factor.

Relick, W.J.
"Using Graphic Instruments to Hold Down the Electric Power Bill," Plant Engineering, vol. 28, April 18, 1974, pp. 130-132; May 30, 1974, pp. 73-75.

Discusses instruments needed to conduct a survey of electricity usage and how to conduct the survey.

U.S. Federal Energy Administration.
Electrical Conservation Measures in the Commercial Sectors: The Los Angeles Experience. Springfield, Virginia: National Technical Information Service (NTIS) (N75-13388) Paper copy - $4.25/Microfilm $2.25. Available from NTIS.*

U.S. Federal Energy Administration.
Twenty Ways to Save Electricity. 2 pages (191-D) Free. Available from FEA.*

Lists brief hints for saving electricity.

4. HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS

"Application and Adjustment of Controls for Energy Economy," Heating/Piping/Air Conditioning, vol. 47, February 1975, pp. 36-43.

Suggestions for conserving energy in HVAC systems, building temperature, outside air requirements, maintenance and others. Recommends conducting a life-cycle cost analysis of equipment.

Bowlen, Kennard L.
"Energy Recovery From Exhaust Air," ASHRAE Journal, vol. 16, April 1974, pp. 49-56.

Several types of air-to-air heat recovery equipment used for energy recovery from exhaust air are described. Recovery of sensible heat is compared to recovery of both sensible and latent heat on a year-round basis from actual climatic conditions for applications where heating, humidification, cooling and dehumidification are required. The cost savings for selected equipments under various climatic conditions are illustrated.

Bridgers, Frank H.
"How New Technology May Save Energy in Existing Buildings," Heating/Piping/Air Conditioning, vol. 47, no. 9, August 1975, pp. 50-55.

Retrofit of heat pump cycles, both conventional and solar assisted, to existing buildings should be considered when major building changes are under consideration. Includes charts of different heat pump systems.

"Conservation Story Takes to the Road," Electric World, vol. 183, no. 4, February 15, 1975, pp. 80-81.

Potomac Edison Company built a mobile display on energy conservation housed in a truck. The display demonstrates 14 energy saving tips for industry and commerce, including such heat conservation methods as a static heat exchanger, pumped liquid heat exchange, vaporized liquid heat exchange, mechanical refrigeration heat transfer, use of floating insulation covers, minimizing use of vent hoods, etc.

"Efficient Utilization of Natural Gas Energy," American Gas Association Monthly, vol. 56, January 1974, pp. 19-20.

Discusses how gas for heating and cooling is much more energy efficient than electricity.

"Energy Conservation in Commercial Building," Heating/Piping/Air Conditioning, vol. 46, June 1974, pp. 50-55.

Tips include: (1) Reduce exhaust air volumes, use chemical air purifiers, (2) Reduce infiltration with a slight positive pressure ratio, and (3) Adjust air supply systems to minimize air volumes, lower speed where possible.

"Saving Air and Energy in Industrial Plants," Heating/Piping/Air Conditioning, vol. 46, October 1974.

Air conservation involves two phases: (1) Saving fuel for heating makeup air to replace air exhausted or discharged, (2) Saving electric power for fan operation, air cleaning, or air conditioning. Recommendations cover exhaust air volumes in existing systems, processes and operations, low volume - high velocity hoods, localized ventilation, push-pull ventilation, and recirculation of air.

Schwieger, R.G.
"Utilities, Industry Burn Refuse to Generate Power," Power, vol. 119, February 1975, Supplement pp. 15-23.

Describes results of eight incineration plants that currently are producing steam in waterwall boilers solely from the combustion of municipal refuse. Presents possible plant design changes for future plants. Lists refuse to energy projects operating or planned.

Shavit, G.
"Enthalpy Control Systems; Increased Energy Conservation; Engineering Data File," Heating/Piping/Air Conditioning, vol. 46, January 1974, pp. 117-122.

This control system monitors outside air and return damper air for enthalpy (total heat content) and uses the air requiring the least energy to condition. The enthalpy override control system saves more energy than a simple economizer system.

"True Measure of Energy Conservation," American Gas Association Monthly, vol. 56, November 1974, pp. 24-25.

The American Gas Association disagrees with the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 90-P, "Design and Evaluation Criteria for Energy Conservation in New Buildings." It permits electric water heaters with the use of electric heat; the American Gas Association considers both of these to be inefficient.

"Unique All-Air System Conserves Energy in United California Bank," Heating/Piping/Air Conditioning, vol. 46, no. 1, January 1974, pp. 52-55.

The system saves energy by using outdoor air whenever possible for cooling. A heating system with separate ducts recirculates air from lighting fixtures, elevator motors, and transformers. A solar compensator provides a 30 minute time delay for flip-flop from heating to cooling. Because of low heating load, no boiler room was built. Electric coils supplement the recirculating system.

U.S. Federal Energy Administration.
Potential for Energy Savings Through Reducing Hot Water Consumption. Prepared by Office of Energy Conservation and Environment. Washington 20461. 58 pages Free. Available from FEA.*

Study of various savings possibilities suggesting that water heating offers great potential for energy savings.

5. LIGHTING

U.S. Federal Energy Administration.
Energy Conservation Applied to Office Lighting. Springfield, Virginia: National Technical Information Service (NTIS). (PB-244 154/AS) Paper Copy - $8.75/Microfilm - $2.25. Available from NTIS.*

U.S. Federal Energy Administration.
Lighting and Thermal Operations: Energy Management Action Program for Commercial, Public, Industrial Buildings. Two booklets: (1) "Building Energy Reports-Case Studies," 24 pages; and (2) "Guidelines," 16 pages (136-D) Free. Available from FEA.*

(1) Discusses energy savings achieved in 19 specific buildings by implementing energy conservation programs.

(2) Explains how energy can be saved in commercial and industrial buildings.

U.S. Federal Energy Administration.
An Outline for Saving Energy: Lighting and Thermostats in Commercial, Public, and Industrial Buildings. 1 page (192-D) Free. Available from FEA.*

Lists easy steps that can be taken to conserve energy in buildings.

6. REFRIGERATION SYSTEMS

"Byerly's Finds Frost Sensor Saves Energy," Frozen Food Age, vol. 22, no. 12, July 1974, p. 57.

Case study of decreased energy requirements from installation of a new "demand defrost" control system. This system activates electric defrost heaters according to frost accumulation rather than on a timed cycle.

Hicks, N.G. and Rubel, F., Jr.
"New Condenser Cleaning System Makes Large Dent in Energy Usage," Building Systems Design, vol. 72, February 1975, pp. 3-6.

A new, simple method of continuously cleaning refrigeration machine condenser tubes provides a major improvement in equipment operating efficiency. As a result, increased system capacity and reduced energy consumption are experienced. The energy consumption reduction, which has been as high as 35 percent, is normally in the 10-20 percent range. Installations employing these systems have been in use up to five years.

Kuhnen, John A.
"An Insulation Contractor's View on How to Cut Energy Use," Frozen Food Age, vol. 23, no. 10, May 1975, pp. 124-125.

Discusses factors affecting energy requirements in freezers, such as temperature difference, insulation thickness and excessive use of doors.

Lloyd, W. Burton.
"How to Determine Most Economical Choice of Insulation Thickness for Freezer, Cooler," Frozen Food Age, vol. 23, no. 10, May 1975, pp. 120-123.

Discusses costs and benefits of various insulation thicknesses and their impact on energy requirements. Includes case studies and graphs.

"Seventeen Ways to Save Refrigeration Dollars," Food Engineering, vol. 47, no. 5, May 1975, pp. 89-90.

Energy conserving tips that can reduce initial and operating costs and keep refrigeration systems operating at peak efficiency.

Stamm, Richard H.
"Second and Third Generation Designs for Industrial Refrigeration," ASHRAE Journal, November 1974, pp. 30-35.

Addresses refrigeration engineers. The author discusses why designers of industrial refrigeration systems have the "first generation syndrome" with systems designed for past requirements. How they can start giving owners improved systems, engineered for current and future requirements, with an eye toward energy conservation and cost-saving factors is discussed.

"Two Phase Booster Ejector for Air Conditioning and Refrigeration Cycles," Heating/Piping/Air Conditioning, vol. 47, August 1975, pp. 56-59.

A two phase ejector has been applied to a refrigeration cycle to recover part of the available energy normally lost in the expansion or throttling valve controls.

COMMONLY REFERENCED ADDRESSES

Federal Energy Administration
Publications Distribution Office
Office of Communications and Public Affairs
Washington, D.C. 20461

Office of Energy Programs
Room 2203
Department of Commerce
Washington, D.C. 20230

National Technical Information Service
Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

ORGANIZATIONS CONTACTED

Agricultural Technical Assistance Foundation

Air-Conditioning and Refrigeration Institute

American Academy of Transportation

*American Association of Meat Processors

*American Automobile Association

American Bakers Association

American Correctional Food Service Association

American Cultured Dairy Products Institute

American Dairy Association

American Farm Bureau Federation

American Farm Economy Association

American Fisheries Society

American Frozen Food Institute

*American Gas Association

American Home Economics Association

American Institute of Baking

American Institute of Food Distribution

American Institute of Industrial Engineers

American Institute of Plant Engineers

American Meat Institute

American National Cattlemen's Association

American Poultry & Hatchery Federation

American Retail Association Executives

American Retail Federation

American Seafood Distributors Association

American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.

American Society of Mechanical Engineers

American Sugar and Cane League

American Trucking Association

American Tunaboat Association

Associated Independent Dairies of America

Associated Retail Bakers of America

Associated University Bureaus of Business and Economic Research

Associated Wholesale Grocers, Inc.

Association of American Railroads

*Association of Home Appliance Manufacturers

Association of Operative Millers

Automotive Information Council

Better Kitchens Institute

Beverage Machinery Manufacturers Association

Board of Trade of the Wholesale Seafood Merchants

Bureau of Raw Materials for American Vegetable

* Major contributor

Bakery Equipment Manufacturers Association

Brewers Association of America

Candy, Chocolate and Confectionary Institute

Car Care Council

*Commercial Refrigerator Manufacturers Association

Containerization Institute

Corn Industries Research Foundation

Corn Refiners Association

Council of Better Business Bureaus

Edison Electric Institute

Electric Energy Association

Electrical Equipment Representatives Association

*The Electrification Council

Executive Stewards' and Caterers' Association

Farm Electrification Council

Farm Equipment Manufacturers Association

Federal Fishing Boats of New England and New York

Fishery Council

Food Distribution Research Society

Food Merchandisers of America

Food Processing Machinery and Supplies Association

Gas Appliance Manufacturers Association

Gas Appliance Engineers Society

Grain Elevator and Processing Society

Grain and Feed Dealers National Association

Grain Processing Machinery Manufacturers Association

Industrial Heating Equipment Association

Institute of American Poultry Industries

Institute of Appliance Manufacturers

Institute of Gas Technology

Institute of Shortening and Edible Oils

International Association of Agricultural Economists

International Association of Ice Cream Manufacturers

International Association of Refrigerated Warehouses

International Food Research and Educational Center

International Society of Food Service Consultants

Manufacturers' Agents for Food Service Industry

Mass Retailing Institute

Master Brewers Association of America

Millers' National Federation

Mobile Industrial Caterers' Association

Motor Vehicle Manufacturers Association of the U.S.

National American Wholesale Grocers' Association

National Association of Concessionaires

* Major Contributor

National Association of Convenience Stores

National Association of Dairy Equipment Manufacturers

National Association of Engine and Boat Manufacturers

National Association of Fleet Administrators

National Association of Food Chains

National Association of Frozen Food Packers

National Association of Independent Food Retailers

National Association of Manufacturers

National Association of Meat Purveyors

*National Association of Retail Grocers of the U.S.

National Association of State Departments of Agriculture

National Association of State Universities & Land Grant Colleges

National Association of Wholesaler-Distributors

National Association of Wine Producers and Bottlers

National Beer Wholesalers' Association of America

National Brands Soft Drinks Institute

National Candy Wholesalers Association

*National Canners Association

National Commercial Refrigeration Sales Association

National Confectioners Association of the U.S.

National Cottonseed Products Association

National Council of Physical Distribution Management

National Education Association

National Electrical Manufacturer Association

National Farm and Power Equipment Dealers Association

National Fisheries Institute

National Food Brokers Association

National Food Distributors Association

National Food Service Association

National Frozen Food Association

*National Grain & Feed Association

National Housewares Manufacturers Association

National Ice Association

Nation l Ice Cream Retailers Association

National Independent Dairies Association

National Independent Meat Packers Association

National Industrial Cafeteria Managers Association

National Institute of Locker and Freezer Provisioners

National Institutional Food Distributor Associates

National Licensed Beverage Association

National Liquor Stores Association

National Livestock Producers Association

* Major contributor.

National Milk Producers Federation

National Oil Fuel Institution

National Poultry, Butter & Egg Association

National Prepared Frozen Food Processors Association

*National Restaurant Association

National Retail Merchants Association

National Shellfisheries Association

*National Soft Drink Association

National United License Beverage Association

Railway Fuel & Operation Officers Association

Railway Systems and Management Association

The Refrigeration Research Foundation

Research & Development Associates for Military Food

Retail Confectioners International

Rice Millers Association

Society for Advancement of Management, Inc.

Shellfish Institute of North America

Specialty Bakery Owners of America

Sugar Association, Inc.

*Super Market Institute

United States Beet Sugar Association

United States Brewers Association

United States Cane Sugar Refiners' Association

United Fresh Fruit & Vegetable Association

Western Highway Institute

Wine and Spirits Wholesalers of America

* Major contributor.

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